

What is claimed is:

1. A circuit for delivering electrical energy as one of defibrillation pulses and pacing pulses to a patient, the circuit comprising:
 - a power source;
 - an H-bridge comprising a plurality of switches which control the delivery of the electrical energy from the power source to the patient; and
 - a current control circuit which regulates electrical current supplied to the patient, the current control circuit serially connected with the H-bridge.
2. The circuit according to claim 1, wherein the current control circuit regulates the current in response to a current control signal.
3. The circuit according to claim 2, wherein the current control signal is a dc value.
4. The circuit according to claim 2, wherein the current control signal has a first value where a first pair of the plurality of switches is operated and a second value where a second pair of the plurality of switches is operated.
5. The circuit according to claim 2, wherein the current control signal is a waveform having a shape of a desired current waveform to be delivered to the patient.
6. The circuit according to claim 5, wherein the current control waveform has a first shape where a first pair of the plurality of switches is operated and a second shape where a second pair of the plurality of switches is operated.

7. The circuit according to claim 5, wherein the shape of the control signal waveform is a truncated exponential waveform.

8. The circuit according to claim 6, wherein the shapes of the first and second waveforms are truncated exponential waveforms.

9. The circuit according to claim 5, wherein the shape of the control signal waveform is half sinusoidal.

10. The circuit according to claim 6, wherein the shapes of the first and second waveforms are half sinusoidal.

11. The circuit according to claim 5, wherein the shape of the control signal waveform is rectangular.

12. The circuit according to claim 6, wherein the shapes of the first and second waveforms are rectangular.

13. The circuit according to claim 1, wherein the current control circuit operates as a switch prior to an operation of the plurality of switches.

14. The circuit according to claim 13, wherein the plurality of switches and the current control circuit are operated to deliver the electrical energy as a biphasic pulse to the patient.

15. A defibrillator-pacer for delivering electrical energy to a patient, the defibrillator-pacer comprising:

a storage circuit having first and second terminals, the storage circuit operable to store electrical energy;

an H-bridge circuit, coupled to the first terminal of the storage circuit, adapted to couple with the patient and operable to deliver electrical current from the storage circuit energy to the patient; and

a current control circuit, coupled with the H-bridge circuit and operable to electrically connect the H-bridge circuit with the second terminal of the storage circuit, to regulate the delivery of the electrical energy to the patient.

16. The defibrillator-pacer according to claim 15, wherein the current control circuit operates in a linear mode and responsive to a control voltage.

17. The defibrillator-pacer according to claim 15, wherein the current control circuit comprises an amplifier, a transistor and a resistor arranged as a voltage to current follower.

18. The defibrillator-pacer according to claim 16, further comprising:

a controller which:

controls the H-bridge to control the polarity of the electrical current delivered to the patient; and
determines the control voltage.

19. The defibrillator-pacer according to claim 18, wherein the control voltage is a fixed value.

20. The defibrillator-pacer according to claim 18, wherein the control voltage has a time varying waveform.

21. The defibrillator-pacer according to claim 20, wherein the time varying waveform is a sinusoidal waveform.

22. The defibrillator-pacer according to claim 20, wherein the time varying waveform is a decaying exponential waveform.

23. The circuit according to claim 20, wherein the time varying waveform is a half sinusoidal waveform.

24. The circuit according to claim 20, wherein the time varying waveform is a rectangular waveform.

25. The circuit according to claim 20, wherein the time varying waveform is a rounded rectangular waveform.

26. The circuit according to claim 20, wherein the time varying waveform is a damped sinusoidal waveform.

27. A defibrillator-pacer for delivering electrical energy to a patient, the defibrillator-pacer comprising:

a storage circuit having first and second terminals, the storage circuit operable to store electrical energy;

an H-bridge circuit, coupled to the first terminal of the storage circuit, adapted to couple with the patient and operable to deliver electrical current from the storage circuit energy to the patient; and

a current control circuit, coupled with the H-bridge circuit and operable to electrically connect the H-bridge circuit with the second terminal of the storage circuit, to regulate the delivery of the electrical energy to the patient, the control circuit comprising:

a first transistor, an amplifier and a resistor arranged as a voltage to current follower which controls the current

through the patient according to a predetermined scale factor determined by the resistor and a first control voltage, and a second transistor which bypasses the first resistor in response to a second control voltage to change the scale factor of the voltage to current follower.

28. A defibrillator-pacer for delivering electrical energy to a patient, the defibrillator-pacer comprising:

a storage circuit having first and second terminals, the storage circuit operable to store electrical energy;

an H-bridge circuit, coupled to the first terminal of the storage circuit, adapted to couple with the patient and operable to deliver electrical current from the storage circuit energy to the patient; and

a current control circuit, coupled with the H-bridge circuit and operable to electrically connect the H-bridge circuit with the second terminal of the storage circuit, to regulate the delivery of the electrical energy to the patient, the control circuit comprising:

a first resistor connected in series with the H-bridge which limits the current through the patient;

a first transistor, an amplifier and a second resistor arranged as a voltage to current follower which controls the current through the patient according to a predetermined scale factor determined by the first resistor, the second resistor and a first control voltage,

a second transistor which bypasses the first resistor in response to a second control voltage to change the scale factor of the voltage to current follower.

29. The defibrillator-pacer according to claim 28, wherein the control circuit further comprises:

a third transistor which bypasses the second resistor in response to a third control voltage to further change the scale factor of the voltage to current follower.

30. A method of regulating current delivered to a patient by an H-bridge circuit of a defibrillator-pacer, the H-bridge having a high potential node which receives electrical current from a first node of an energy storage circuit having electrical energy stored therein, a plurality of switches which direct the electrical current through the patient and a low potential node which returns the current to a second node of the storage circuit, the method comprising:

inserting a current regulator circuit between the low potential node of the H-bridge and the second node of the storage circuit to control the current according to an input voltage signal;

selectively activating predetermined ones of the plurality of switches for at least one predetermined time interval to direct the current through the patient; and

applying the input voltage signal to the current regulator during the at least one predetermined time interval.

31. The method according to claim 30, wherein the applying of the input voltage signal precedes the beginning of the at least one time interval.

32. The method according to claim 30, wherein the applying of the input voltage signal precedes the storage of energy in the energy storage circuit.

33. The method according to claim 30, wherein the applying of the input signal is subsequent to the beginning of the storage

of energy in the energy storage circuit and the applying of the input signal precedes the beginning of the at least one time interval.

34. The method according to claim 30, wherein the applying of the input signal precedes the selective activation of predetermined ones of the plurality of switches.

35. The method according to claim 30, wherein the applying of the input signal is concurrent with the selective activation of predetermined ones of the plurality of switches.